

XXIX. *On the remarkable Formation of the Trachea in the Egyptian Tantalus. By Joshua Brookes, Esq., F.R.S. & L.S.*

*Read March 16, 1830.*

OF all the organs with which animals are furnished, the vital organs justly excite our highest admiration; and in contemplating the great variety of conformation in the thoracic viscera in various species, the physiologist is frequently at a loss to account for the function of their striking peculiarities of structure.

The subject of the present observations is the trachea of the *Tantalus Ibis*, or Egyptian Tantalus\*, a bird rarely imported in a living state, and probably the present specimen of that organ is the only one of the kind in Europe. I am not aware that there is any record of a similarly constructed trachea having been found in any other genus of the feathered tribe. This bird died shortly after its arrival in England; and being sent to Mr. Leadbeater for preservation, he kindly presented me with the body in a recent state.

As there is not any unusual occurrence in the upper part of the trachea, I shall proceed immediately to describe that portion of the organ which is contained within the thorax. Here a lateral compression takes place of about three inches in length, and an inch in breadth; the part thus compressed is larger and rounder at one margin than it is at the other, where

\* The preparation of this organ was presented to the Zoological Society, and may now be seen in the Museum of that Institution.

it is almost acute, but having a small indentation inferiorly. It is formed of flattened minute rings (connected by intervening membranes) firmly ossified at their rounded edge. From the lower extremity the bronchi separate; these decussate each other in a very extraordinary manner, as may be seen in the specimen. The membranous spaces between the rings of the bronchi are very distinct; and I must confess myself at a loss to account for this singular arrangement. The trachea occupies the anterior surface of the œsophagus at the entrance into the thorax. This proceeds to its destination between the bronchi.

Probably one reason for the compressed figure of the inferior part of the trachea may be for the purpose of allowing large erpetalous animals to descend in deglutition with greater facility than could otherwise happen without impediment to respiration; for in consequence of the ossified structure of this singular portion of the *aspera arteria*, neither the pressure of the individual by its volume, nor by its struggles *in articulo mortis*, would cause obstruction.

Perhaps it is not possible for the naturalist to investigate any subject more fraught with interest than the pulmonary organ in birds, the more striking peculiarities of which exist in some of the genera of the order *Grallatores*; for instance, in the *Gruidæ*, the *Platalea*, and, as it now seems, in the *Tantalus*. They are found also in the *Anatidæ* almost universally; and although the genus *Anser* is an exception, nevertheless the *Anser semipalmatus*, an Australian goose, is singularly furnished with the most contorted trachea of the whole aquatic tribe.

The species of the genus *Cygnus* are remarkable for the contortions of the trachea within the carina of the sternum, but the domestic swan is altogether an exception, and presents another discrepancy in the number of the ribs. The form of the trachea in the *Fuligula nigra* (Black Scoter) is the most simple among  
the

the ducks, having only a trifling enlargement of that organ and of the bronchi.

The *Cracidæ* and *Capricalcæ* (*Urogallus*) exhibit also manifestations of similar conformation, as well as an individual of the Cassican family, described by M. Lesson in his "Manuel d'Ornithologie," under the title *Phonygama Keraudrenii*, and probably in other birds whose larynges and tracheæ have not as yet fallen under my notice.

The very remarkable circumstance of the tracheæ in many birds, especially those of the order *Natatores*, being ossified and composed of various pieces, and each ring being entire (not as in man and mammalia, having a muscular membrane occupying the posterior third part of the canal), which possibly can only be accounted for from the apparent necessity of the air being required to remain in the body of the animal, rarefied in readiness for the purpose of raising itself, whenever it may be induced to wing its flight through the atmosphere; and assuredly aquatic birds must be rendered very buoyant in consequence when swimming.

The bodies of the pelican (*Onocrotalus*), gannet (*Sula*), and chaja (*Palamedea Chavaria*) may be inflated almost like a bladder between the skin and muscles; so also, but partially, that of the powting pigeon, the adjutant, marabou, and tachypetes, but particularly the emeu, whose trachea, somewhat below the middle of the neck, being there deficient in cartilaginous rings, is formed into a membranous sac, which can be distended at pleasure: and everybody has seen the male turkey, in the pride of dominion, enlarge its breast and even menace the spectator; faculties clearly tending to accelerate progression when required.

With few exceptions, birds, having a crop, are not furnished with inflexions, or obvious deviations from the apparent ordinary

nary structure of the trachea: quans, curassows, the caperkally, and *Phonygama Keraudrenii*, are instances of those exceptions.

Nothing striking in this respect occurs in individuals of the order *Raptores*, all of which have an ingluvies, with an *os furciforme* very strong, and bent concavely for its support; whereas in the *Rasores* the same bone is of so delicate a nature, that in one of the largest species, the turkey, it is even of a slighter texture, in proportion to the size of the bird, than in all the other genera. This circumstance arises probably from the species of this order being constructed more for walking than flying; the turkey especially, whose migrations are sometimes of considerable extent, performing them chiefly on foot. The *Struthionidæ* have no perfect *os furciforme*.

I hope to be understood as not implying that there is no peculiarity of the larynges and tracheæ, except in some genera; for I believe all have the admirable mechanism of the organ of voice differently constructed, with corresponding muscles, and distribution of nerves, producing those various modulations of sound so familiar to us, and destined for the excitement of love, as well as for other purposes.

It would seem superfluous in me to offer further observations on this head, after the luminous representations which are to be found in different authors, demonstrating these facts, but more particularly by Mr. Yarrell, who favoured the Society with highly interesting details of this curious subject, illustrated by preparations, and drawings of the remarkable forms of the labyrinths, larynges, divaricating septa, and extensive contortions of the tracheæ in various species, as well as of the appropriate muscles, some of which were before altogether undescribed.

It may be thought worthy of remark, that the *Tantalus* affords the only instance, I am acquainted with, except the spoonbill,  
of

of a bird that feeds on large living animals, having a very obvious augmentation of the trachea. As in the spoonbill also, in which the formation of the lower portion of the trachea is the same, the inferior larynx of our bird is deficient, as are likewise the muscles, and consequently it is found to produce few variations of sound.

Neither the adjutant, the largest of the *Grallatores*, nor the stork, heron, pelican, gannet, corvorant, or loon, has any such structure. Of the jabiru and albatross I cannot speak with any certainty.